

## The Bioscience AMS Program at LLNL

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A prediction at AMS-5 expected that by the year 2000 there would be more AMS facilities involved in bioscience applications than in geoscience research. With more than half of that time now passed, AMS retains the ability to surprise biological scientists with the sensitivity for isotope tracing, and numerous interesting studies have now been performed. However, the enthusiasm has not translated into large programs at other than a few isolated sites. The Center for AMS continues a vigorous demonstration of the usefulness of AMS in studies of pharmacokinetics, environmental tracing, toxicology, molecular damage and repair, elemental distribution, and human health risks.  $^{14}\text{C}$  remains the primary isotope used in labeled organic compounds, but we have shown the sensitivity of  $^3\text{H}$  detection, opening pharmacokinetics to unprecedented double-labeled studies.  $^{41}\text{Ca}$  studies form the basis of another contribution submitted separately.  $^{59}\text{Ni}$  exploratory efforts have been performed with rats after  $^{63}\text{Ni}$  capability had been shown useful for neutron dose reconstruction reported separately. Initial efforts in developing  $^{79}\text{Se}$  for seleno-protein tracing are on hold while further spectrometer equipment is installed. The much-requested (by biomedical scientists) availability of  $^{129}\text{I}$  measurements for labeled proteins and enzymes awaits construction of a new heavy ion detection line and further research into rapid sample conversion techniques. Using radiocarbon, extensive tracing of human carcinogens such as benzene and phenyl-imidazopyridine have shown that some organic compounds are truly linear in their dose extrapolation to low human exposures, while others increase in tissue availability at these low levels. Multi-sector tandem mass spectrometry has been combined with AMS to determine the actual molecular targets of human carcinogens. AMS immunoassays are being used to look at environmental contaminants such as atrazine and PCBs. Finally, new programs have begun between CAMS and a consortium of campuses that promise to bring a new spectrometer to LLNL for continued expansion of bioscience AMS at LLNL and the University of California.

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